many tenanted by other insects in various stages of transformation. Like other spiders, when one meets another there is a fight, which often ends in the death of both.

The spider itself is a very interesting creature. It is about five-twelfths of an inch in length; its legs are short, strong, and flattish. The head carries eight simple eyes; the maxillary palpi of the female are leg-like and hooked. There are four stigmata. The colour is nearly black. The abdomen is not large in proportion to the rest of the body, and bears at its extremity four spinnerets, two large and two small.

I send with this paper specimens of the houses and also of the spider. In all cases the houses do not look so well, neither are they so perfect as when fresh cut from the trees; this is partly owing to the shrinking and twisting of the bark in drying. If I can give any other information respecting this spider, or if it would be acceptable to you for me to send other accounts of personal observation, I shall be pleased to do what I can, according to the limited time I have for this, my favourite pleasure.

4. Notes on the Visceral Anatomy of certain Auks.

By R. W. Shufeldt, C.M.Z.S. &c.

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About two years ago the Smithsonian Institution of Washington placed in my hands for anatomical description a fine collection of bird-skeletons, amounting to nearly a hundred in number, that had been collected by American explorers at different times and at several localities in the Arctic regions. My researches upon this material will quite fill a volume, and are illustrated by several hundred original drawings, the whole being in charge of the Smithsonian Institution for publication. When I received this collection it was accompanied by a few selected alcoholic specimens of Albatrosses and Auks, sent to me with them in order that I might obtain skeletons that were not to be found among the rest of the material, my work having chiefly to do with the osteology of the groups represented. Among the spirit-specimens of the Auks I found one of each of the two interesting forms known to us as *Brachyrhamphus marmoratus* and *Synthliborhamphus antiquus*, or the Marbled Murrelet and Ancient Murrelet respectively. These birds rarely fall into the hands of anatomists in such good condition as these were; and although I only needed their skeletons for the purpose I had in view at the time, I nevertheless took the pains to carefully remove certain parts of their visceral anatomy, and again placing these parts back in the alcohol, I have them now before me for examination.

My surprise was very great to find in these two forms, supposed to be very closely related generically, how very different the corresponding structures and organs occupying the chest and abdomen really were. Some of these differences will be readily appreciated by simply

glancing at the drawings made of them, and which illustrate this paper.

When Forbes was with us and produced his admirable work upon the anatomy of the Tubinares which were collected during the voyage of H.M.S. "Challenger"[1], he found a great deal that was not only unique in the structure of Petrels, but in forms more or less nearly related to them. And I am of the opinion that when we come to examine carefully into the morphology of Arctic water-fowl, and more especially into that of their "soft parts," we shall discover much of interest, to say nothing of its importance as throwing light upon the organization of the types in question, as bearing upon the anatomy of the earlier forms of birds; for it is among these groups, as we know, that we find many of the more lowly members of the class in point of structure and organization.

This fact was never more forcibly brought to my mind than after reading Forbes's investigations and observing the points I am now about to describe.

In *S. antiquus* (fig. 1, p. 45) I find the lower larynx rather broad, and somewhat compressed from before backwards. The semirings of the bronchial tubes seem to be only partly formed in bone, while the last tracheal ring and the pessulus are completely ossified, the latter bar being **V**-shaped on the vertical section, with the apex above. What appears to me as most remarkable about this larynx is the mass of fat that overlies it in front, and extends on to its posterior aspect, where it becomes thinner. This fat completely covers the tracheo-laterales muscles, which are inserted on either side into the middle points of the last tracheal ring. The sterno-tracheales are very large and lie embedded in this mass of fat. These are the only tracheal muscles present.

Referring to *B. marmoratus*, fig. 2, we find the structure of the parts to be quite different. In the specimen before me, at least, there is an entire absence of fat from this part of the lower larynx. The anterior extremities of the lower tracheal ring, which is here, too, thoroughly ossified, do not meet so completely as they do in *S. antiquus*, or perhaps, more correctly speaking, this ring is roundly notched in front. *B. marmoratus* has a pessulus of a form corresponding very closely to the one described above for *S. antiquus*, but the tracheal tube above it is rather more cyclindrical, and not so much compressed from before backwards. The lateral tracheal muscles seem to agree quite closely in these two Auks, both as regards their size and points of insertion into the mid-lateral parts of the last tracheal ring, where they dilate slightly as they become inserted. Some considerable difference, however, is to be noted in the sterno-tracheal muscles of *B. marmoratus*, as will be seen in the figure; they are given off much higher up on the trachea in this Auk, and are far slenderer than they are in *S. antiquus*.

Unfortunately I neglected to examine the condition of the carotids in these two Auks before removing the viscera, as I was intent upon not injuring their very brittle skeletons, which had become much softened by soaking so long in the partially dissolved fat that encased

[1] W. A. Forbes, Zool. Chall. Exp. vol. iv. pt. xi. p. 1.

the bodies of both of them. I will at once observe, however, that the form of the heart is quite different in these two birds, being not only smaller in *S. antiquus* than it is in the Marbled Auk or Murrelet, but apparently longer, and decidedly more pointed in the former than it is in the latter, wherein it is a thicker organ with a bluntly rounded apex (fig. 2).

Fig. 1.

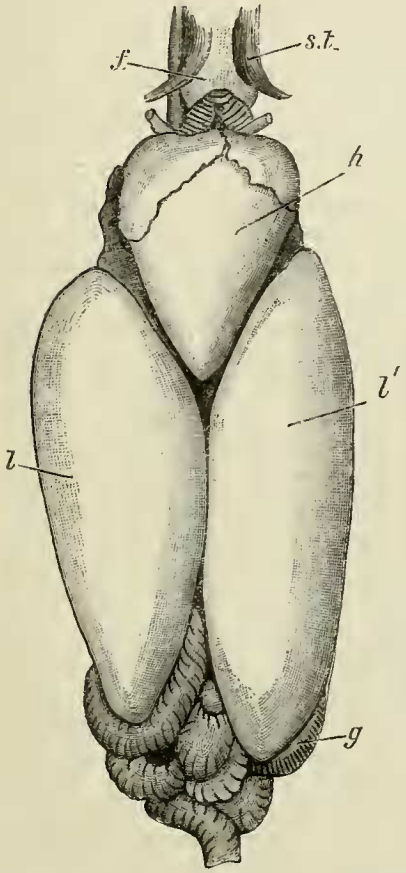

Fig. 2.

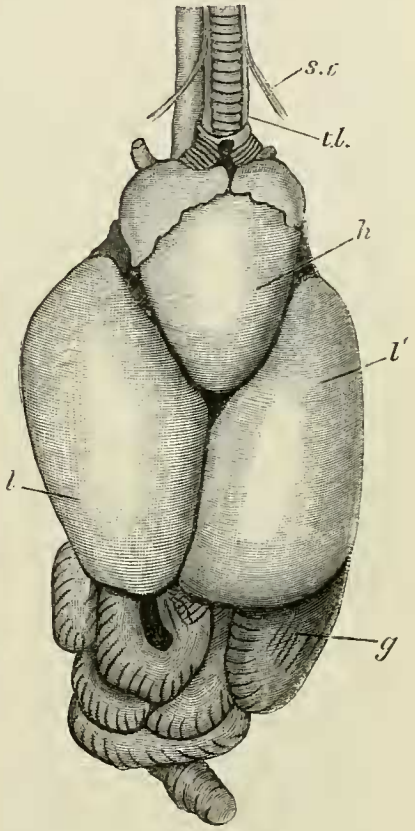

Fig. 1. Anterior aspect of the lower larynx, heart, and viscera of *Synthliborhamphus antiquus*. *f*, fat overlying in front of the lower larynx; *s.t*, sterno-trachealis muscle of the left side; *h*, heart; *l*, right lobe of liver; *l'*, left lobe of liver; *g*, gizzard.

Fig. 2. Same parts and aspect of the corresponding organs in *Brachyrhamphus marmoratus*; lettering the same as in fig. 1, with *t.l*, the left tracheo-lateralis muscle.

The figures are drawn life-size by the author, and are from the specimens of the Murrelets lent by the Smithsonian Institution.

Extraordinary differences are to be observed in the livers of these two Murrelets, both as regards form and size. In each the left lobe is rather the larger, and descends somewhat further into the abdomen. But in *S. antiquus* the hepatic lobes are considerably

longer and narrower than they are in *B. marmoratus*, and with more pointed extremities. In *S. antiquus*, too, the connecting band of hepatic tissue, joining the two lobes at the back and above, is far more extensive than it is in *B. marmoratus*; I fail to find any trace of a third lobe in either of these Auks.

Both of these Murrelets possess a large pear-shaped gall-bladder, lying, in either case, beneath the inferior edge of the right lobe of the liver. Likewise in each is the spleen well developed; but this organ in *S. antiquus* is long and subcylindrical in form, while in *B. marmoratus* it is shorter, thicker, and of a decidedly pyriform outline.

Macgillivray gives us a very good description, illustrated by three figures, of the proventriculus and gizzard of the Little Auk (*Mergulus alle*), which appears in the eighth volume of Audubon's 'Birds of America,' the royal quarto set. In the birds before me I fail to find the band of "glandules," arranged as a belt at the extremity of the proventriculus, at the entrance of the stomach. Nor is the œsophagus so thin as Macgillivray found it to be in *M. alle*: in other particulars, however, these Auks seem to be quite similar to it; for I find the inner coat of the elongated proventriculus and the lower part of the œsophagus thrown into strong longitudinal rugæ or folds, among which the surface is thickly studded with minute openings, which I take to be the mouths of the glandules. These rugæ are continuous with similar, longitudinal elevations in the gizzard; but in this latter cavity they are covered by a closely fitting corneous structure that readily peals off in the alcoholic specimens, leaving the rugæ in a condition precisely as we find them in the proventriculus and œsophagus. The gizzard and proventriculus are continuous and but faintly marked externally by a constriction which shows the ending of the latter and commencement of the former, while internally, as I say, the definition is made quite sharp by the corneous layer of the gizzard. The disposition of the muscles of this latter organ are somewhat differently arranged from what Macgillivray gives us in his figure of *M. alle*. The tendon from which the fibres radiated in the Murrelets above described is situated quite laterally, and nearly opposite the pyloric exit of the pouch; while in Macgillivray's drawing of the Little Guillemot, already referred to, this gastric tendon is centrally located as we see it in Pigeons and other birds. Both of my specimens had entirely empty gizzards, the cavities not even containing a few grains of coarse gravel, which is not an uncommon thing, I believe, in certain Auks.

The intestines of these Murrelets present us with nothing worthy of special remark, and I find a well-developed and large pancreas present in each. According to Macgillivray, in *M. alle* the rectal extremity of the intestinal tube becomes much enlarged and quite globular, while a short distance above it we find a pair of cæca of no great size. Unfortunately an accident happened to these parts in both of my specimens; but I presume much the same arrangement would obtain, as, so far as I know, all Auks are thus constructed in regard to this part of their economy.

If hereafter the differences I have pointed out are found to be